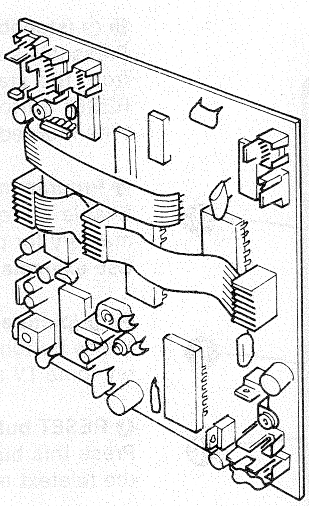
OPK-203B/G/S

SERVICE MANUAL



AEP Model
UK Model

OPK-203B. . .for English
OPK-203G. . .for German
OPK-203S. . .for Swedish

November, 1983

This manual supplements the operating instruction for the Sony XE and PE chassis TV receivers.
Before operating the set, please read this manual thoroughly. This manual should be retained for future reference.

MICROFILM

ACC

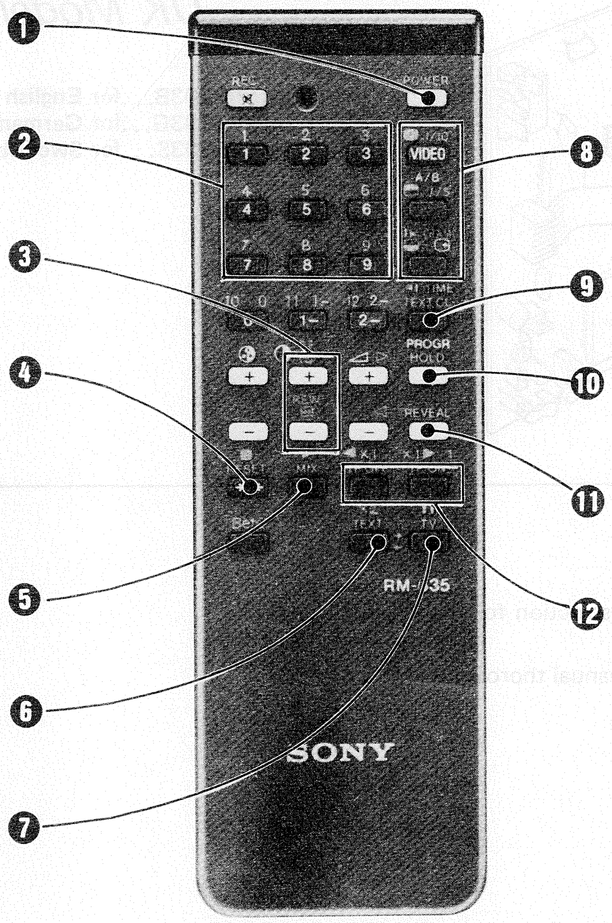
TELETEXT ADAPTOR

SONY®

SECTION 1
GENERAL

1-1. FUNCTION OF BUTTONS ON THE REMOTE COMMANDER

RM-632 (UK Model)
RM-635 (AEP Model)



The numbers and symbols for the teletext mode are in green.

❶ ⏻ (standby) switch
Press this switch to turn the TV in standby mode. To turn on the TV from the standby mode, press a program number button or the RESET button.
When turned on, the TV will enter the TV mode.

❷ Program number buttons
Enable corresponding digits (0-9) to be entered into the teletext memory for page number and time.
See example two, six or seven.

❸ ◑ (picture) buttons
These buttons adjust the picture contrast of the TV programs and, on some TV sets, of the teletext display.

❹ RESET button
Press this button to cancel all functions and change the TV from the teletext mode to the TV mode.

❺ MIX button
Enables the teletext display to be seen superimposed on the normal TV picture of the selected channel.
See example four.

❻ TEXT button
Press this button to change the TV from the TV mode to the teletext mode.

❼ TV button
Press this button to change the TV from the teletext mode to the TV mode.

❽ ●, ◓, ◒ (character height) buttons
◓ – Enlarges top half of the teletext display.
◒ – Enlarges bottom half of the teletext display.
● – Restores normal character height.
See example five.

❾ TIME/TEXT CL (clear) button

Suppresses the teletext display and restores the normal TV picture.
See example six.
This button enables time to be displayed in the TV mode.
This time is the same as the time indication in the teletext mode (top right hand corner). The time display will continue for 5 seconds after the release of the button.
If no teletext service is broadcast on the selected channel, the time display is incorrect, however.

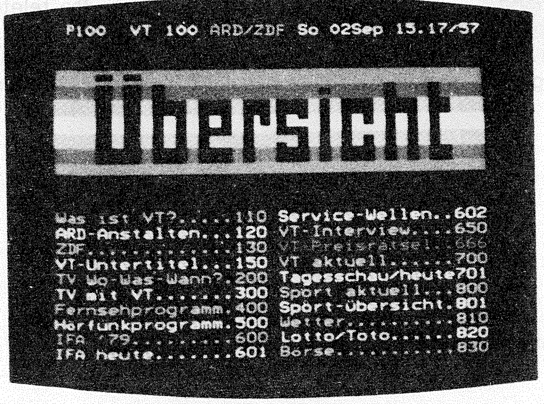
❿ HOLD button
Enables the requested page to be held so that it cannot be updated.
See example three.

⓫ REVEAL button
Displays the answers on a quiz page.
See example eight.

⓬ TP ON, TP OFF (timed page operation) buttons
When the TP ON button is pressed, the teletext memory will capture a selected page at a preset time. This function can be useful if information on a particular page changes throughout the day.
Press the TP OFF button to cancel the timed page operation.
See example seven.

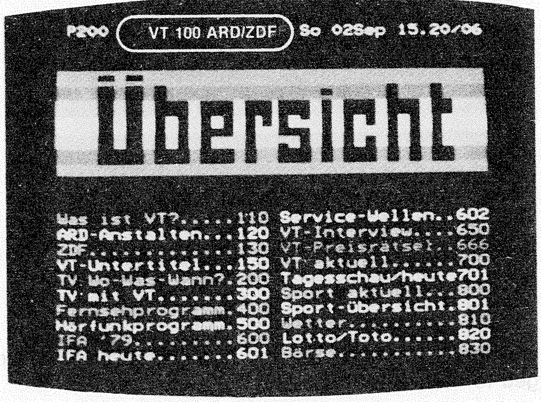
1-2. TO VIEW THE TELETEXT SERVICE

1



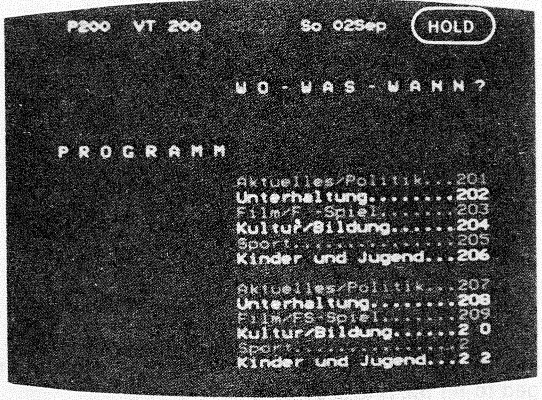
```
P100  VT 100 ARD/ZDF So 02Sep 15.17/57

Übersicht

Was ist VT?.....110 Service-Wellen..602
ARD-Anstalten...120 VT-Interview....650
ZDF.............130 VT-Preisrätsel..666
VT-Untertitel...150 VT aktuell......700
TV Wo-Was-Wann?.200 Tagesschau/heute701
TV mit VT.......300 Sport aktuell...800
Fernsehprogramm.400 Sport-Übersicht.801
Hörfunkprogramm.500 Wetter..........810
IFA '79.........600 Lotto/Toto......820
IFA heute.......601 Börse...........830
```

2



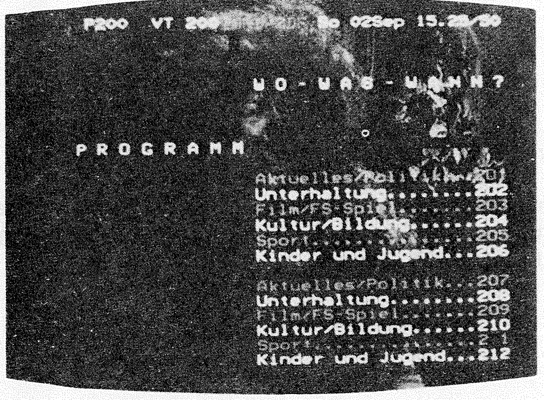
```
P200 (VT 100 ARD/ZDF) So 02Sep 15.20/06

Übersicht

Was ist VT?.....110 Service-Wellen..602
ARD-Anstalten...120 VT-Interview....650
ZDF.............130 VT-Preisrätsel..666
VT-Untertitel...150 VT aktuell......700
TV Wo-Was-Wann?.200 Tagesschau/heute701
TV mit VT.......300 Sport aktuell...800
Fernsehprogramm.400 Sport-Übersicht.801
Hörfunkprogramm.500 Wetter..........810
IFA '79.........600 Lotto/Toto......820
IFA heute.......601 Börse...........830
```

3



```
P200  VT 200          So 02Sep  (HOLD)

                  WO-WAS-WANN?

PROGRAMM
                  Aktuelles/Politik...201
                  Unterhaltung........202
                  Film/F -Spiel.......203
                  Kultur/Bildung......204
                  Sport...............205
                  Kinder und Jugend...206

                  Aktuelles/Politik...207
                  Unterhaltung........208
                  Film/FS-Spiel.......209
                  Kultur/Bildung......2 0
                  Sport...............2
                  Kinder und Jugend...2 2
```

4



```
P200  VT 200          So 02Sep 15.

                  WO-WAS-WANN?

PROGRAMM
                  Aktuelles/Politik...201
                  Unterhaltung........202
                  Film/FS-Spiel.......203
                  Kultur/Bildung......204
                  Sport...............205
                  Kinder und Jugend...206

                  Aktuelles/Politik...207
                  Unterhaltung........208
                  Film/FS-Spiel.......209
                  Kultur/Bildung......210
                  Sport...............2 1
                  Kinder und Jugend...212
```

BEFORE OPERATION

- First select the TV channel for the desired teletext service, then press the TEXT button. After you have pressed the TEXT button, the TV channel cannot be changed.
- To receive the teletext service of a different TV station, first restore the TV mode with the TV or RESET button, then select the new station.
- To avoid a malfunction in the teletext mode, do not operate any button which is not described here. If you become confused during the operation, press the RESET button and start again.
- In the teletext mode, be sure to keep the AFT ON button of the TV activated. Otherwise, misoperation may occur.

EXAMPLES OF OPERATION

Example one

TO DISPLAY THE INDEX PAGE

Press the TEXT button. If this is the first time the TV has been put in the teletext mode since being switched on, the index page of the selected teletext service will automatically appear on the screen. If it is not the first time, key in three-digit teletext service index page number using the program number buttons. Proceed to "example two".

Example two

TO OBTAIN A DESIRED TELETEXT PAGE

Key in the correct three digits for the required page. The header display at the top of the page will turn green to show that the teletext decoder is waiting for the page you have requested to be broadcast. When that page is next transmitted, it will be displayed on the screen.

If an error is made in keying the page number, complete the three-digit sequence by keying in any digit. Then re-key the correct page number.

Example three

TO STOP THE PAGE

Press the HOLD button and the teletext decoder will stop entering any new pages into its memory. The mode is indicated in green at the top right hand corner.

This button may be used with "SUBPAGES". See page 8.

To resume normal teletext operation, press the TEXT button.

Example four

TO SUPERIMPOSE THE TELETEXT PAGE ON THE NORMAL TV PICTURE

Press the MIX button. To restore normal teletext operation, press the TEXT button. To restore normal TV operation, press the TV button. The MIX button can be used in either the teletext mode or the normal TV mode.

Example five

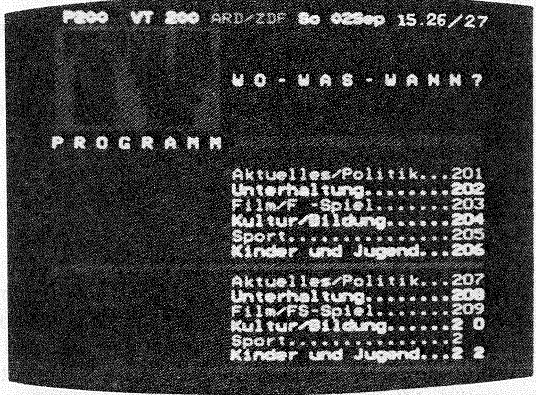
TO ENLARGE THE TELETEXT DISPLAY

The ⬒ and ⬓ buttons enlarge the teletext display to twice its normal height.

This method is very convenient for long distance viewing or for people with poor eyesight. To enlarge the display.

5

1



P200 VT 200 ARD/ZDF So 02Sep 15.26/27

W O - W A S - W A N N ?

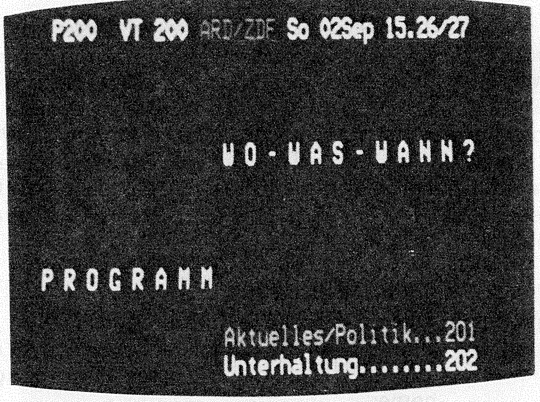
P R O G R A M M

Aktuelles/Politik...201
Unterhaltung........202
Film/F -Spiel.......203
Kultur/Bildung......204
Sport...............205
Kinder und Jugend...206

Aktuelles/Politik...207
Unterhaltung........208
Film/FS-Spiel.......209
Kultur/Bildung......2 0
Sport...............2
Kinder und Jugend...2 2

1 Obtain a teletext display on the screen.

2



P200 VT 200 ARD/ZDF So 02Sep 15.26/27

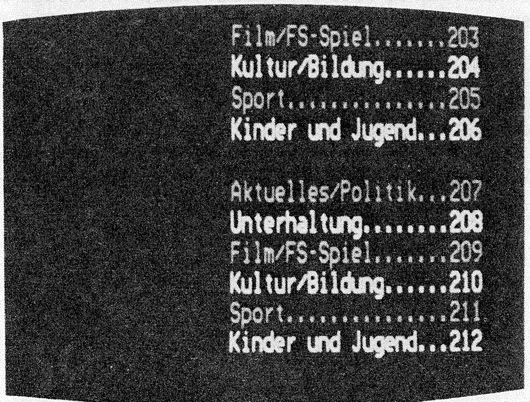
WO-WAS-WANN?

PROGRAMM

Aktuelles/Politik...201
Unterhaltung........202

2 Operate the ⬒ button. The top half of the page will now be enlarged to fill the entire screen.

3



Film/FS-Spiel.......203
Kultur/Bildung......204
Sport...............205
Kinder und Jugend...206

Aktuelles/Politik...207
Unterhaltung........208
Film/FS-Spiel.......209
Kultur/Bildung......210
Sport...............211
Kinder und Jugend...212

3 Operate the ⬓ button. The lower half of the page will now be enlarged to fill the entire screen.

To return to normal character height, press the ● button.

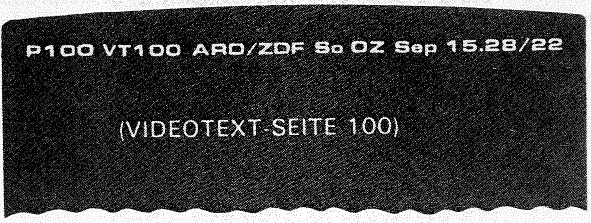
If you request another page while the lower section of a page is being displayed, the top half only of the requested page will automatically be displayed.

6

Example six

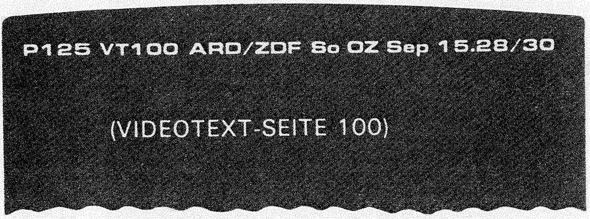
TO WATCH A NORMAL TV PROGRAM WHILE THE TELETEXT DECODER IS SEARCHING FOR YOUR DESIRED PAGE

1 Obtain a teletext display on the screen.

1

P100 VT100 ARD/ZDF So OZ Sep 15.28/22

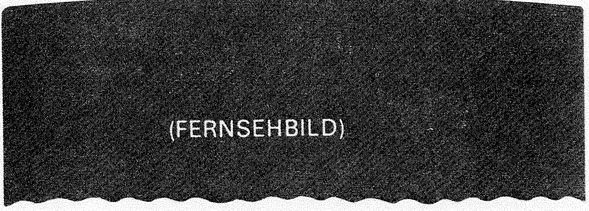
(VIDEOTEXT-SEITE 100)

2 Now, request another page. The page header will turn green while the decoder is waiting for the page to be transmitted.

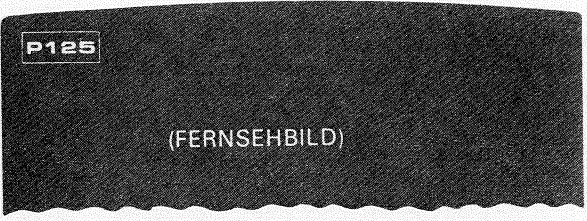
2

P125 VT100 ARD/ZDF So OZ Sep 15.28/30

(VIDEOTEXT-SEITE 100)

3 Press the TEXT CL button and the normal TV picture will be restored. (The page header will be displayed for the first few seconds).

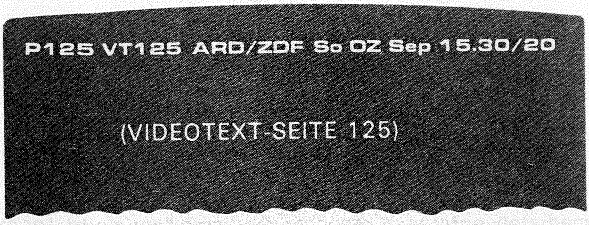
3

(FERNSEHBILD)

4 Leave the set in this mode. When your requested page has been captured by the decoder, the page number will be shown in the top left hand corner.

4

P125

(FERNSEHBILD)

5 If you wish to view this requested page, press the TEXT button.

5

P125 VT125 ARD/ZDF So OZ Sep 15.30/20

(VIDEOTEXT-SEITE 125)

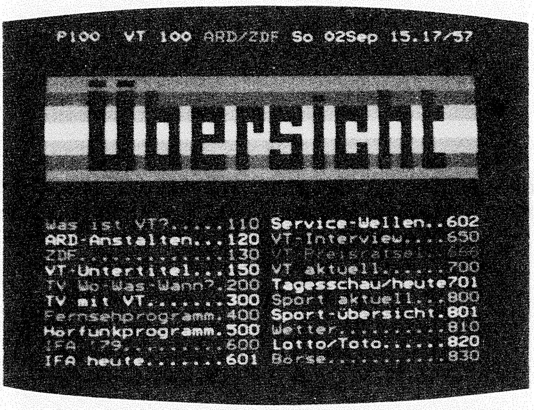
Example seven

TO HAVE A REQUESTED PAGE BROADCAST AT A PREDETERMINED TIME

The time coding facility enables you to select and store a page of text for display at some predetermined time. It may be used therefore to provide an accurate visual alarm feature reminding you that you wished to do something at a particular time e.g. when programs on two TV channels overlap it could remind you to change channels at the correct time.

7

1

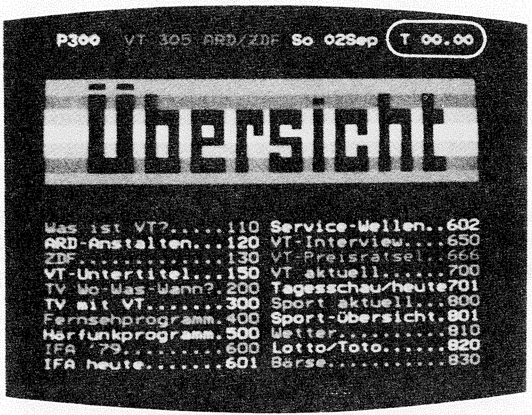


```
P100  VT 100 ARD/ZDF So 02Sep 15.17/57

Übersicht

Was ist VT?.....110 Service-Wellen..602
ARD-Anstalten...120 VT-Interview....650
ZDF.............130 VT-Preisrätsel..666
VT-Untertitel...150 VT aktuell......700
TV Wo-Was-Wann?.200 Tagesschau/heute701
TV mit VT.......300 Sport aktuell...800
Fernsehprogramm.400 Sport-übersicht.801
Horfunkprogramm.500 Wetter..........810
IFA '79.........600 Lotto/Toto......820
IFA heute.......601 Borse...........830
```

1 Obtain a teletext display on the screen by pressing the TEXT button.

2 Enter new page request.

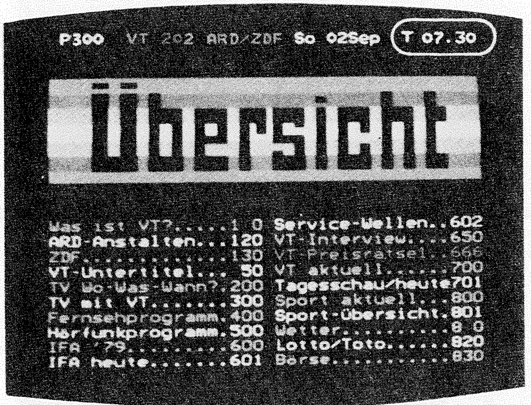
3



```
P300  VT 305 ARD/ZDF So 02Sep T 00.00

Übersicht

Was ist VT?.....110 Service-Wellen..602
ARD-Anstalten...120 VT-Interview....650
ZDF.............130 VT-Preisratsel..666
VT-Untertitel...150 VT aktuell......700
TV Wo-Was-Wann?.200 Tagesschau/heute701
TV mit VT.......300 Sport aktuell...800
Fernsehprogramm.400 Sport-Übersicht.801
Hörfunkprogramm.500 Wetter..........810
IFA '79.........600 Lotto/Toto......820
IFA heute.......601 Börse...........830
```

3 Press the TP ON button.
As soon as the TP ON button is pressed, the time display on the top right of the screen starts flashing.

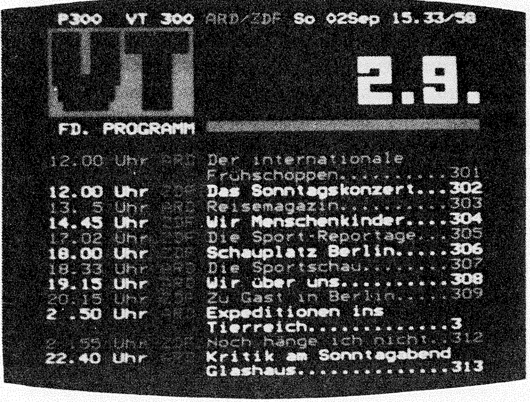
4



```
P300  VT 202 ARD/ZDF So 02Sep T 07.30

Übersicht

Was ist VT?.....1 0 Service-Wellen..602
ARD-Anstalten...120 VT-Interview....650
ZDF.............130 VT-Preisratsel..666
VT-Untertitel... 50 VT aktuell......700
TV Wo-Was-Wann?.200 Tagesschau/heute701
TV mit VT.......300 Sport aktuell...800
Fernsehprogramm.400 Sport-übersicht.801
Hörfunkprogramm.500 Wetter..........8 0
IFA '79.........600 Lotto/Toto......820
IFA heute.......601 Börse...........830
```

4 Immediately enter your request time using four digits, for example 07:30.

5



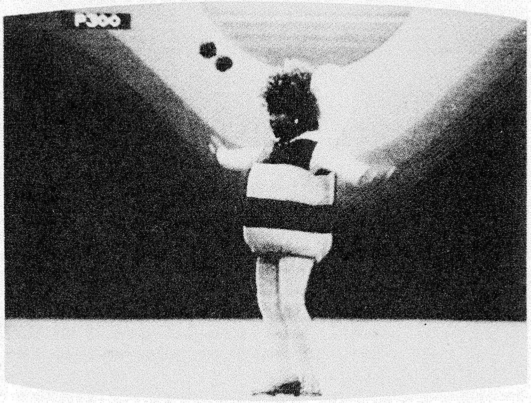
```
P300  VT 300 ARD/ZDF So 02Sep 15.33/58
                              2.9.
FD. PROGRAMM
12.00 Uhr ARD Der internationale
              Frühschoppen..........301
12.00 Uhr ZDF Das Sonntagskonzert...302
13. 5 Uhr ARD Reisemagazin..........303
14.45 Uhr ZDF Wir Menschenkinder....304
17.02 Uhr ZDF Die Sport-Reportage...305
18.00 Uhr ZDF Schauplatz Berlin.....306
18.33 Uhr ARD Die Sportschau........307
19.15 Uhr ZDF Wir über uns..........308
20.15 Uhr ZDF Zu Gast in Berlin.....309
2 .50 Uhr ARD Expeditionen ins
              Tierreich.............3
2 .55 Uhr ZDF Noch hänge ich nicht..312
22.40 Uhr ZDF Kritik am Sonntagabend
              Glashaus..............313
```

5 Leave the set in this mode. The teletext decoder will not capture your requested page until the present time and the preset time correspond. When they do correspond, the requested page will be entered into the teletext memory and displayed on the screen.

To watch the normal TV picture while waiting for your requested page to be displayed.

6 Press the TEXT CL button. The page header will be displayed for the first few seconds.

7



7 When the requested page has been captured, it will be indicated on the screen. To display the requested teletext page, press the TEXT button.

To cancel the timed page operation, press the TP OFF button in the teletext mode.

Notes

- The timed text facility can only be set up in the text mode of operation.
- Not all transmitted pages of teletext will allow operation of the timed text facility.
- Timed text operation will not be completed if the received channel is changed after selecting timed text mode.

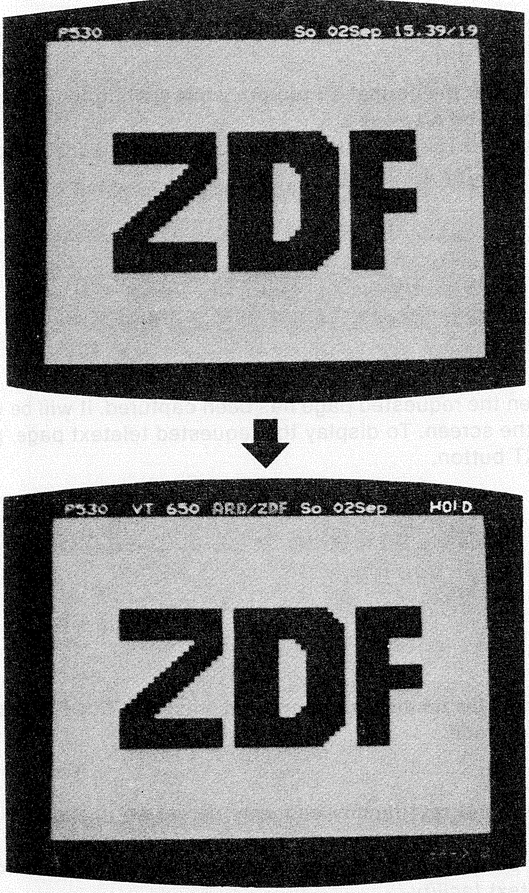
Example eight

TO REVEAL ANSWERS TO A QUIZ

When parts of a quiz page are deliberately concealed on the first display, press the REVEAL button to see the answers. As long as this button is depressed, all parts of the page are displayed.

OTHER TYPES OF TELETEXT PAGES

Subpages — Each main page may be divided up into several subpages (usually marked 1-->2, 2-->3, and so on). The time that a particular subpage is displayed should be long enough for you to read the full display. The next subpage will automatically be displayed as soon as it is broadcast. If the display time of a page is too short, use the HOLD button to cancel the automatic display of the next subpage.



Newsflash and subtitle pages — These pages are superimposed on the normal TV picture. They usually contain brief information. Select these pages in the teletext mode and press the TEXT CL button. Updated newsflashes will be automatically displayed on the screen.

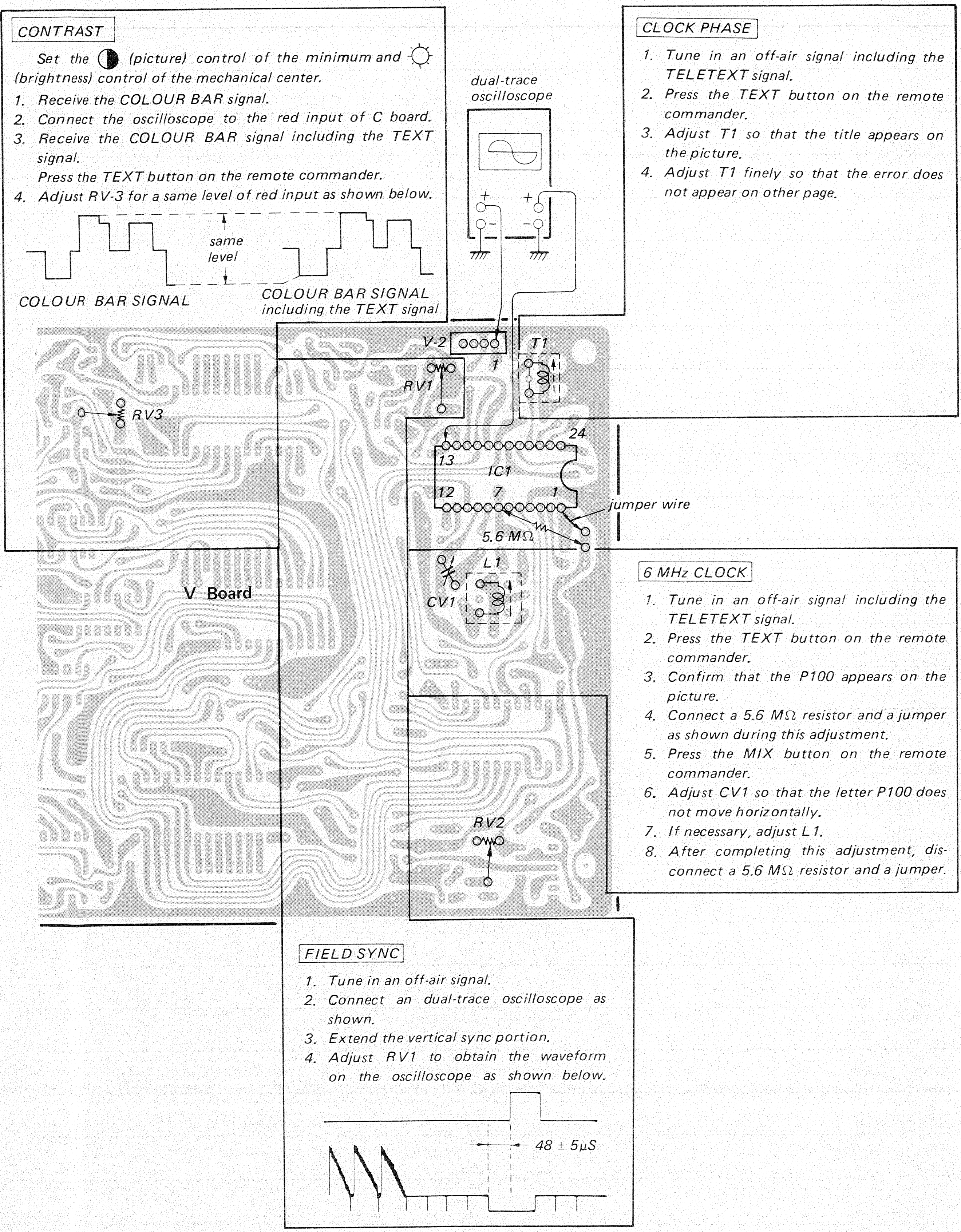
Schlagzeilen

Picture adjustment
The picture level of the background normal TV picture can be adjusted by using the ◑ button which will operate in the newsflash/subtitle page mode as well as in the MIX mode.

MEMO

SECTION 2
ADJUSTMENTS

2-1. V BOARD ADJUSTMENTS



CONTRAST

Set the ◐ (picture) control of the minimum and ☼ (brightness) control of the mechanical center.

1. *Receive the COLOUR BAR signal.*
2. *Connect the oscilloscope to the red input of C board.*
3. *Receive the COLOUR BAR signal including the TEXT signal.*
   Press the TEXT button on the remote commander.
4. *Adjust RV-3 for a same level of red input as shown below.*

CLOCK PHASE

1. *Tune in an off-air signal including the TELETEXT signal.*
2. *Press the TEXT button on the remote commander.*
3. *Adjust T1 so that the title appears on the picture.*
4. *Adjust T1 finely so that the error does not appear on other page.*

6 MHz CLOCK

1. *Tune in an off-air signal including the TELETEXT signal.*
2. *Press the TEXT button on the remote commander.*
3. *Confirm that the P100 appears on the picture.*
4. *Connect a 5.6 MΩ resistor and a jumper as shown during this adjustment.*
5. *Press the MIX button on the remote commander.*
6. *Adjust CV1 so that the letter P100 does not move horizontally.*
7. *If necessary, adjust L1.*
8. *After completing this adjustment, disconnect a 5.6 MΩ resistor and a jumper.*

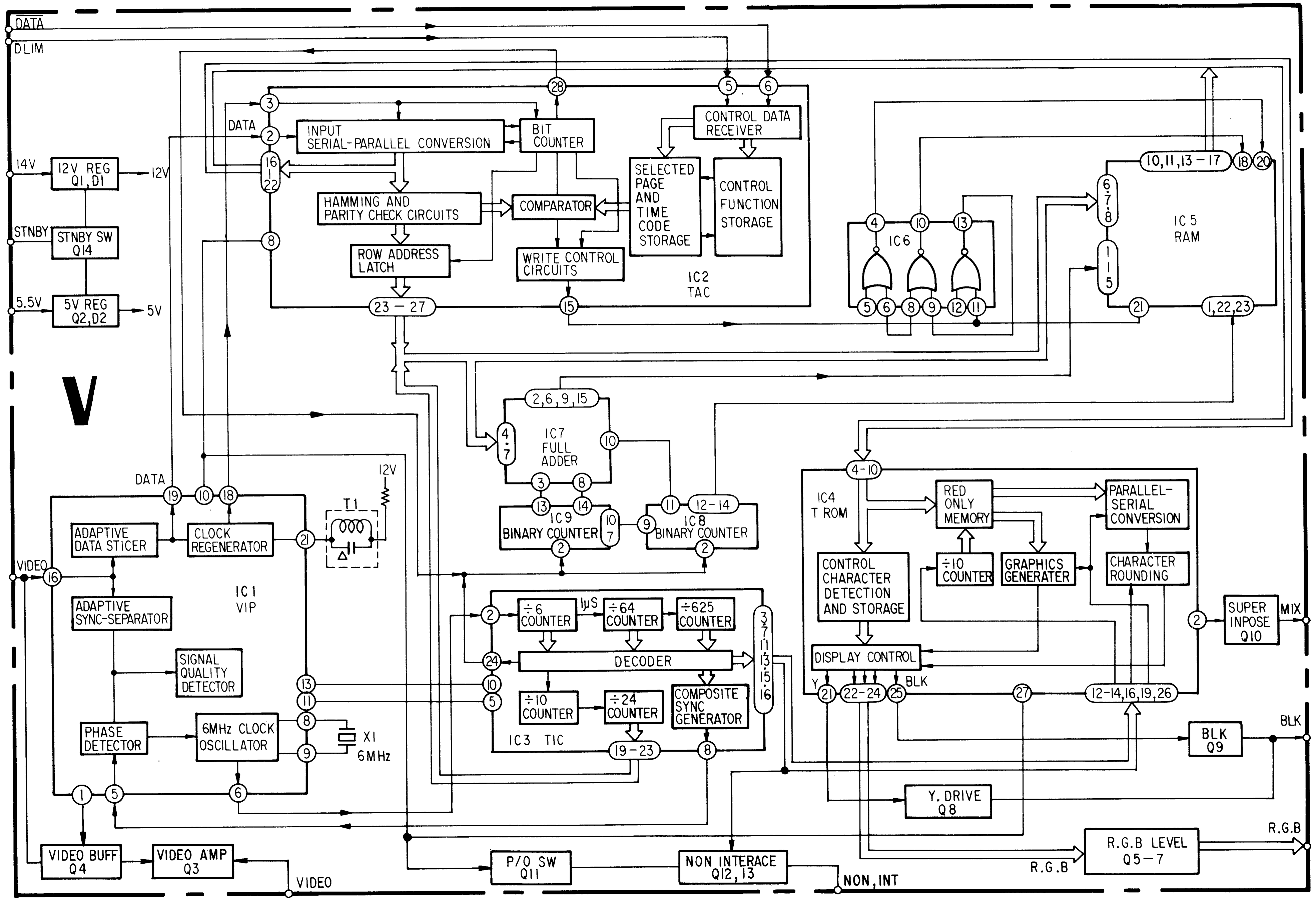
FIELD SYNC

1. *Tune in an off-air signal.*
2. *Connect an dual-trace oscilloscope as shown.*
3. *Extend the vertical sync portion.*
4. *Adjust RV1 to obtain the waveform on the oscilloscope as shown below.*

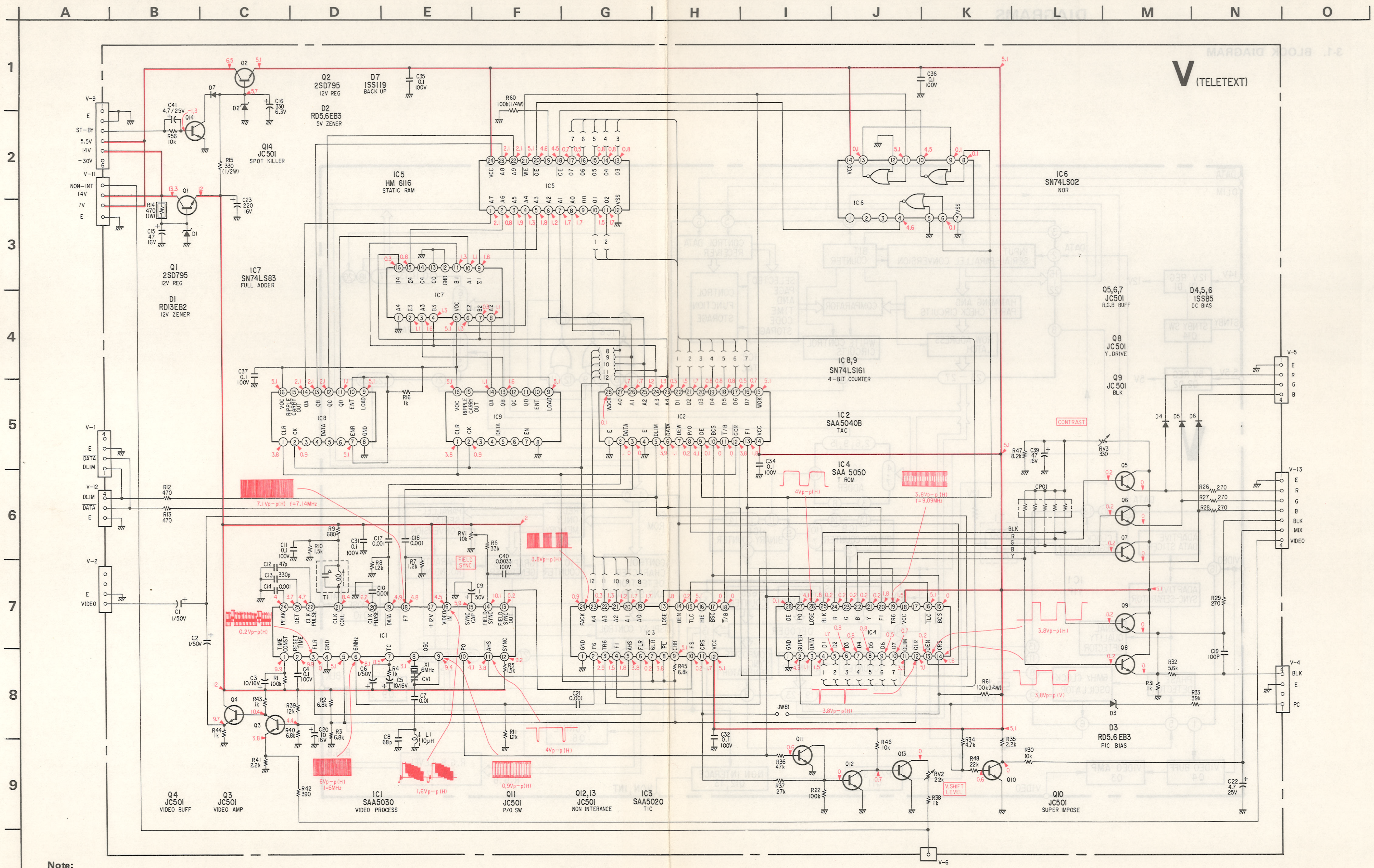
same level
COLOUR BAR SIGNAL
COLOUR BAR SIGNAL including the TEXT signal
dual-trace oscilloscope
+
+
-
-
V-2
T1
1
RV1
RV3
24
13
IC1
12
7
1
jumper wire
5.6 MΩ
L1
CV1
V Board
RV2
48 ± 5μS

SECTION 3
DIAGRAMS

3-1. BLOCK DIAGRAM


DATA
DLIM
14V
12V REG Q1, D1
12V
STNBY
STNBY SW Q14
5.5V
5V REG Q2, D2
5V
V
DATA
INPUT SERIAL-PARALLEL CONVERSION
BIT COUNTER
CONTROL DATA RECEIVER
SELECTED PAGE AND TIME CODE STORAGE
CONTROL FUNCTION STORAGE
HAMMING AND PARITY CHECK CIRCUITS
COMPARATOR
ROW ADDRESS LATCH
WRITE CONTROL CIRCUITS
IC2 TAC
23 – 27
IC6
IC5 RAM
10, 11, 13 – 17
1, 22, 23
IC7 FULL ADDER
2, 6, 9, 15
IC9 BINARY COUNTER
IC8 BINARY COUNTER
12 – 14
12V
T1
DATA
ADAPTIVE DATA STICER
CLOCK REGENERATOR
IC1 VIP
VIDEO
ADAPTIVE SYNC-SEPARATOR
SIGNAL QUALITY DETECTOR
PHASE DETECTOR
6MHz CLOCK OSCILLATOR
X1 6MHz
÷6 COUNTER
1μS
÷64 COUNTER
÷625 COUNTER
DECODER
÷10 COUNTER
÷24 COUNTER
COMPOSITE SYNC GENERATOR
IC3 TIC
19 – 23
IC4 T ROM
4 – 10
RED ONLY MEMORY
PARALLEL-SERIAL CONVERSION
CONTROL CHARACTER DETECTION AND STORAGE
÷10 COUNTER
GRAPHICS GENERATER
CHARACTER ROUNDING
DISPLAY CONTROL
Y
22 – 24
BLK
12–14, 16, 19, 26
SUPER INPOSE Q10
MIX
BLK Q9
BLK
Y. DRIVE Q8
R.G.B LEVEL Q5 – 7
R.G.B
R.G.B
VIDEO BUFF Q4
VIDEO AMP Q3
VIDEO
P/O SW Q11
NON INTERACE Q12, 13
NON, INT

3-2. SCHEMATIC DIAGRAM

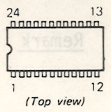

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
1
2
3
4
5
6
7
8
9
V (TELETEXT)
Q2 2SD795 12V REG
D7 1SS119 BACK UP
D2 RD5.6EB3 5V ZENER
Q14 JC501 SPOT KILLER
Q1 2SD795 12V REG
D1 RD13EB2 12V ZENER
IC7 SN74LS83 FULL ADDER
IC5 HM 6116 STATIC RAM
IC6 SN74LS02 NOR
IC8,9 SN74LS161 4-BIT COUNTER
IC2 SAA5040B TAC
IC4 SAA 5050 T ROM
Q5,6,7 JC501 R.G.B BUFF
D4,5,6 1SSB5 DC BIAS
Q8 JC501 Y.DRIVE
Q9 JC501 BLK
CONTRAST
FIELD SYNC
V.SHIFT LEVEL
D3 RD5.6EB3 PIC BIAS
Q4 JC501 VIDEO BUFF
Q3 JC501 VIDEO AMP
IC1 SAA5030 VIDEO PROCESS
Q11 JC501 P/O SW
Q12,13 JC501 NON INTERANCE
IC3 SAA5020 TIC
Q10 JC501 SUPER IMPOSE
V-9
V-11
V-1
V-12
V-2
V-5
V-13
V-4
V-6
7.1Vp-p(H) f=7.14MHz
3.8Vp-p(H)
4Vp-p(H)
3.8Vp-p(H) f=9.09MHz
0.2Vp-p(H)
6Vp-p(H) f=6MHz
1.6Vp-p(H)
0.9Vp-p(H)
4Vp-p(H)
3.8Vp-p(V)

Note:

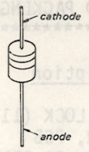
- All capacitors are in μF unless otherwise noted. pF: $\mu\mu$F 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, $^1/_6$ W unless otherwise noted. kΩ: 1000 Ω, MΩ: 1000 kΩ
- △ : internal component.
- ▭ : adjustment for repair.
- All voltages are in V.
- Voltages are dc with respect to ground unless otherwise noted.
- ▬ : B+ bus.

3-3. SEMICONDUCTORS

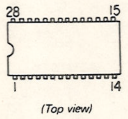
HM6116LP-2
SAA5020
SAA5030
SAA5050


24
13
1
12
(Top view)

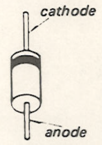
1SS119
1SS148


cathode
anode

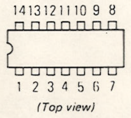
SAA5040


28
15
1
14
(Top view)

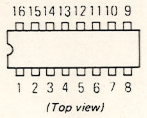
1SS133
RD13E-B2
RD5.6E-B3


cathode
anode

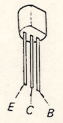
SN74LS02N


14 13 12 11 10 9 8
1 2 3 4 5 6 7
(Top view)

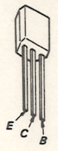
SN74LS161AN
SN74LS83AN


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
(Top view)

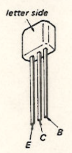
2SC1364
JC501



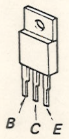
2SC2458



2SC2785

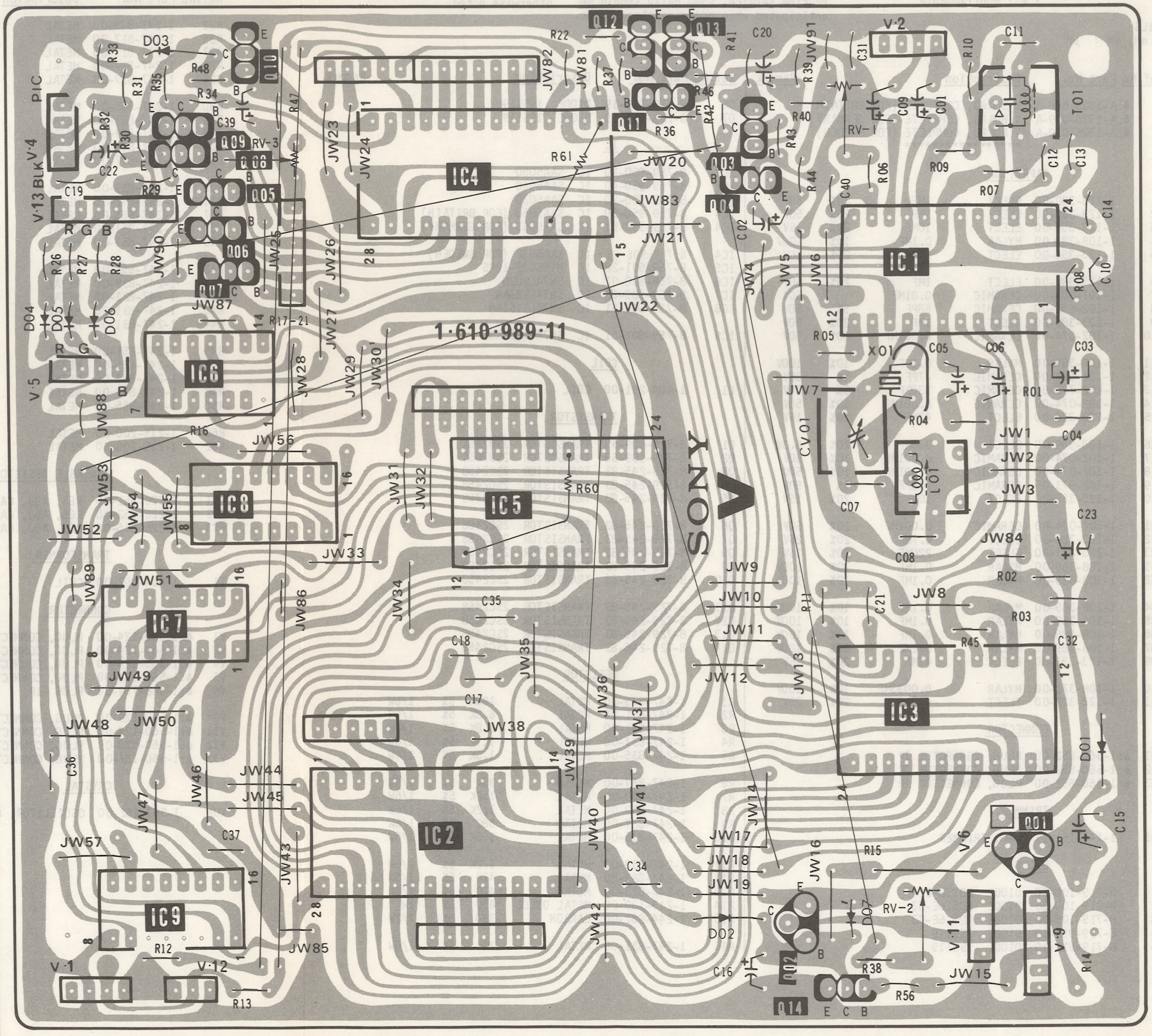

letter side
E C B

2SD795A



3-4. PRINTED WIRING BOARD – *Conductor Side* –

	Q, IC	D	ADJ
1	10 12 13	03	
2	11 09 03 08 IC4 04		RV1 RV3
3	05 06 07 IC1		
4	IC6	04 05 06	
5	IC6 IO5		
6	IC4		
7	IC3		
8	IC2 01		
9	IC9 02 14	02 07	RV2
	Q, IC	D	ADJ


A
B
C
D
E
F
G
H
J
K
L
1
2
3
4
5
6
7
8
9
10
1-610-989-11
SONY
V
PIC
V-4
V-13 BLK
V-5
V-1
V-12
V-2
V-6
V-11
V-9
RV-1
RV-2
RV-3
R G B
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
Q01
Q02
Q03
Q04
Q05
Q06
Q07
Q08
Q09
Q10
Q11
Q12
Q13
Q14
D01
D02
D03
D04
D05
D06
D07
X01
CV01
L01
T01
JW1
JW2
JW3
JW4
JW5
JW6
JW7
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R01
R02
R03
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R05
R06
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R09
R10
R11
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R13
R14
R15
R16
R17-21
R22
R26
R27
R28
R29
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R38
R39
R40
R41
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R43
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R45
R46
R47
R48
R56
R60
R61
C01
C02
C03
C04
C05
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C07
C08
C09
C10
C11
C12
C13
C14
C15
C16
C17
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C19
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C21
C22
C23
C31
C32
C34
C35
C36
C37
C39
C40
E
C
B

SECTION 4

ELECTRICAL PARTS LIST

NOTE:

CAPACITORS
- MF : µF, PF : µµF

COILS
- MMH : mH, UH : µH

RESISTORS
- All resistors are in ohms
- F : nonflammable

- Items marked " ♠ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

Ref.No	Part No.	Description				Remark
	♠:A-1325-008-A	V BOARD, COMPLETE (FOR BRITAIN)				
	♠:A-1325-009-A	V BOARD, COMPLETE (FOR GERMANY)				
	♠:A-1325-010-A	V BOARD, COMPLETE (FOR SWEDEN)				

****

CAPACITOR

C1	1-123-380-00	ELECT	1MF	20%	50V	
C2	1-123-380-00	ELECT	1MF	20%	50V	
C3	1-123-356-00	ELECT	10MF	20%	16V	
C4	1-108-389-00	MYLAR	0.1MF	10%	100V	
C5	1-123-356-00	ELECT	10MF	20%	16V	
C6	1-123-380-00	ELECT	1MF	20%	50V	
C7	1-101-004-00	CERAMIC	0.01MF		50V	
C8	1-102-651-00	CERAMIC	68PF	5%	50V	
C9	1-123-380-00	ELECT	1MF	20%	50V	
C10	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C11	1-108-389-00	MYLAR	0.1MF	10%	100V	
C12	1-101-984-00	CERAMIC	47PF	5%	50V	
C13	1-102-773-00	CERAMIC	330PF	5%	50V	
C14	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C15	1-123-320-00	ELECT	47MF	20%	16V	
C16	1-123-309-00	ELECT	330MF	20%	6.3V	
C17	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C18	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C19	1-102-973-00	CERAMIC	100PF	5%	50V	
C20	1-123-356-00	ELECT	10MF	20%	16V	
C21	1-102-074-00	CERAMIC	0.001MF	10%	50V	
C22	1-123-328-00	ELECT	4.7MF	20%	25V	
C23	1-123-321-00	ELECT	220MF	20%	16V	
C31	1-108-389-00	MYLAR	0.1MF	10%	100V	
C32	1-108-389-00	MYLAR	0.1MF	10%	100V	
C34	1-108-389-00	MYLAR	0.1MF	10%	100V	
C35	1-108-389-00	MYLAR	0.1MF	10%	100V	
C36	1-108-389-00	MYLAR	0.1MF	10%	100V	
C37	1-108-389-00	MYLAR	0.1MF	10%	100V	
C39	1-123-332-00	ELECT	47MF	20%	16V	
C40	1-108-371-00	MYLAR	0.0033MF	10%	100V	
C41	1-123-328-00	ELECT	4.7MF	20%	25V	

CONNECTOR

CN1	♠:1-560-852-00	PLUG, CONNECTOR 7P	
CN2	♠:1-560-852-00	PLUG, CONNECTOR 7P	
CN3	♠:1-560-852-00	PLUG, CONNECTOR 7P	

TRIMMER

CV1	1-141-181-11	CAP, TRIMMER	

DIODE

D1	8-719-100-68	DIODE	RD13E-B2	
D2	8-719-100-36	DIODE	RD5.6E-B3	
D3	8-719-100-36	DIODE	RD5.6E-B3	
D4	8-719-911-19	DIODE	1SS119	
D5	8-719-911-19	DIODE	1SS119	

Ref.No	Part No.	Description		Remark
D6	8-719-911-19	DIODE	1SS119	
D7	8-719-911-19	DIODE	1SS119	

IC

IC1	8-759-950-30	IC	SAA5030	
IC2	8-759-950-40	IC	SAA5040	
IC3	8-759-950-20	IC	SAA5020	
IC4	8-759-950-50	IC	SAA5050 (FOR BRITAIN)	
IC4	8-759-950-51	IC	SAA5051 (FOR GERMANY)	
IC4	8-759-906-05	IC	SAA5052 (FOR SWEDEN)	
IC5	8-759-901-28	IC	MSM5128-12RS	
IC6	8-759-900-02	IC	SN74LS02N	
IC7	8-759-900-83	IC	SN74LS83AN	
IC8	8-759-901-61	IC	SN74LS161AN	
IC9	8-759-901-61	IC	SN74LS161AN	

COIL

L1	1-404-291-00	COIL	

TRANSISTOR

Q1	8-729-109-53	TRANSISTOR	2SD795A	
Q2	8-729-109-53	TRANSISTOR	2SD795A	
Q3	8-729-245-83	TRANSISTOR	2SC2458	
Q4	8-729-245-83	TRANSISTOR	2SC2458	
Q5	8-729-245-83	TRANSISTOR	2SC2458	
Q6	8-729-245-83	TRANSISTOR	2SC2458	
Q7	8-729-245-83	TRANSISTOR	2SC2458	
Q8	8-729-245-83	TRANSISTOR	2SC2458	
Q9	8-729-245-83	TRANSISTOR	2SC2458	
Q10	8-729-245-83	TRANSISTOR	2SC2458	
Q11	8-729-245-83	TRANSISTOR	2SC2458	
Q12	8-729-245-83	TRANSISTOR	2SC2458	
Q13	8-729-245-83	TRANSISTOR	2SC2458	
Q14	8-729-245-83	TRANSISTOR	2SC2458	

RESISTOR

R1	1-247-879-00	METAL	100K	5%	1/6W	
R2	1-247-851-00	METAL	6.8K	5%	1/6W	
R3	1-247-851-00	METAL	6.8K	5%	1/6W	
R4	1-247-831-00	METAL	1K	5%	1/6W	
R5	1-247-835-00	METAL	1.5K	5%	1/6W	
R6	1-247-867-00	METAL	33K	5%	1/6W	
R7	1-247-833-00	METAL	1.2K	5%	1/6W	
R8	1-247-833-00	METAL	1.2K	5%	1/6W	
R9	1-247-827-00	METAL	680	5%	1/6W	
R10	1-247-835-00	METAL	1.5K	5%	1/6W	
R11	1-247-833-00	METAL	1.2K	5%	1/6W	
R12	1-247-823-00	METAL	470	5%	1/6W	
R13	1-247-823-00	METAL	470	5%	1/6W	
R14	1-213-139-00	METAL OXIDE	470	5%	1W	F
R15	1-244-861-00	CARBON	330	5%	1/2W	
R16	1-247-831-00	METAL	1K	5%	1/6W	

Ref.No	Part No.	Description				Remark
R22	1-247-879-00	METAL	100K	5%	1/6W	
R26	1-247-817-00	METAL	270	5%	1/6W	
R27	1-247-817-00	METAL	270	5%	1/6W	
R28	1-247-817-00	METAL	270	5%	1/6W	
R29	1-247-817-00	METAL	270	5%	1/6W	
R30	1-247-855-00	METAL	10K	5%	1/6W	
R31	1-247-831-00	METAL	1K	5%	1/6W	
R32	1-247-849-00	METAL	5.6K	5%	1/6W	
R33	1-247-869-00	METAL	39K	5%	1/6W	
R34	1-247-847-00	METAL	4.7K	5%	1/6W	
R35	1-247-839-00	METAL	2.2K	5%	1/6W	
R36	1-247-871-00	METAL	47K	5%	1/6W	
R37	1-247-865-00	METAL	27K	5%	1/6W	
R38	1-247-831-00	METAL	1K	5%	1/6W	
R39	1-247-857-00	METAL	12K	5%	1/6W	
R40	1-247-851-00	METAL	6.8K	5%	1/6W	
R41	1-247-839-00	METAL	2.2K	5%	1/6W	
R42	1-247-821-00	METAL	390	5%	1/6W	
R43	1-247-831-00	METAL	1K	5%	1/6W	
R44	1-247-831-00	METAL	1K	5%	1/6W	
R45	1-247-851-00	METAL	6.8K	5%	1/6W	
R46	1-247-855-00	METAL	10K	5%	1/6W	
R47	1-247-853-00	METAL	8.2K	5%	1/6W	
R48	1-247-863-00	METAL	22K	5%	1/6W	
R56	1-247-855-00	METAL	10K	5%	1/6W	
R60	1-215-200-00	METAL	100K	5%	1/4W	
R61	1-215-200-00	METAL	100K	5%	1/4W	

VARIABLE RESISTOR

RV1	1-226-851-00	RES, ADJ, CARBON 10K	
RV2	1-226-852-00	RES, ADJ, CARBON 22K	
RV3	1-226-845-00	RES, ADJ, CARBON 330	

TRANSFORMER

T1	1-404-292-00	COIL	

CONNECTOR

V1	♠:1-560-124-00	PLUG, CONNECTOR (2.5MM PITCH) 4P	
V2	♠:1-560-124-00	PLUG, CONNECTOR (2.5MM PITCH) 4P	
V4	♠:1-560-124-00	PLUG, CONNECTOR (2.5MM PITCH) 4P	
V5	♠:1-560-124-00	PLUG, CONNECTOR (2.5MM PITCH) 4P	
V6	♠:1-508-784-00	PLUG 1P	
V9	♠:1-560-126-00	PLUG, CONNECTOR (2.5MM PITCH) 6P	
V11	♠:1-560-124-00	PLUG, CONNECTOR (2.5MM PITCH) 4P	
V12	♠:1-560-123-00	PLUG, CONNECTOR (2.5MM PITCH) 3P	
V13	♠:1-560-127-00	PLUG, CONNECTOR (2.5MM PITCH) 7P	

CRYSTAL

X01	1-567-162-00	OSCILLATOR, CRYSTAL	

ACCESSORIES AND PACKING MATERIALS

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Part No.	Description	Remark
3-701-417-01	PURSE LOCK (11 DIA.)	
♠:3-703-141-00	HOLDER, PCB	
♠:4-321-929-00	HOLDER, PC BOARD	
4-493-869-11	MANUAL, INSTRUCTION	